States of the Former Yugoslavia –
A Different Look at Convergence with the EU Core[1]

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Abstract

The feud between the leaderships of the republics of the Yugoslav federation was portrayed as mostly about development, with some political elites making explicit claims that living standards would catch up with Western Europe after independence and transition. A quarter of a century later, it seems appropriate to see how these former republics have fared in terms of GDP per capita convergence with the EU core countries, defined as the EU member states before the enlargement of 2004. Bearing in mind the deep structural and historical discontinuities, the data set was divided into two sub-periods ('socialist' and 'transition to market economy'). The panel unit root and club convergence approaches were used for both sub-periods The results suggest that during the 'socialist 'period, a larger part of the Yugoslav federation was converging to the EU core than following the breakup of the country and the transition to a market economy.

Introduction

Yugoslavia has had a tumultuous and complicated history since its founding in 1918. It should not be forgotten that at the time of the formation of Yugoslavia the *per capita* income of Slovenia was more than twice that of Serbia proper, while

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Croatia (minus less-developed Dalmatia) was slightly less than twice that of Serbia proper, while the others lagged substantially behind Serbia proper (Fogelquist, 2011, p. 16).

However, we consider the effects of Yugoslavia's common political and economic system after 1945, which lasted for almost half a century, as more important for the understanding of current developments, due to deep structural transformations that occurred during that time. Yugoslavia was not only reunited after the Second World War but it was also unified under a common communist ideology, which evolved into a unique economic system. The almost immediate breakup with Stalin in 1948 set the country on a path of political independence from the Soviet Union, with the slow creation of a socialist market economy based on self-management. Generally, the growth of the Yugoslav economy resulted from a combination of industrialisation based on import substitution and the transfer of labour surplus from agriculture to industry. Urbanisation and universal education contributed to the rise of productivity and growth. The fact that the West provided significant aid of various sorts should be considered a result of the political entrepreneurship of the Yugoslav political elite.

This paper analyses the convergence of Yugoslavia and its constituent parts (later to become independent states) with the developed Western European states over a prolonged period. This is not a simple task, as the country went from a centrally planned economy and an economic blockade by the Soviet-led communist bloc to a socialist market economy, which stagnated in the 1980s. The wars of the breakup and the sanctions were followed by the transition to a market economy and the financial crisis of 2008. In short, on top of the rupture of the country itself, it went through various periods of external shocks. Bearing in mind the deep structural and historical discontinuities, in this paper the data set is divided into two sub-periods the 'socialist' period of 1953 – 1990 and the 'transition to market economy' period of 1991 – 2016.

It should be pointed out that to our knowledge the republics' GDP *per capita* convergence to the developed Western European countries has never been tested for the period when they were members of the Yugoslav federation; i.e., before the breakup. We find this neglect striking. In other words, one would think that given claims that Yugoslavia was holding back the development of its republics and that independence and transition would bring them prosperity, such justifications for the breakup would at least be subject to some kind of empirical investigation.

Furthermore, to our knowledge, club convergence for these states has not been tested for either period. This method, described in a later section, has certain advantages.

1. A Brief Review of the Literature on the Convergence Process in Europe

At the end of the first decade of transition, evidence on convergence in transition countries remained sparse. The general belief that after implementing the necessary transition reforms the transition countries would converge with the GDP *per capita* levels of the EU member states began to be questioned.

Different initial conditions had to be taken into account, thus dividing the countries that were on the path to EU accession at that time from other transition economies. A broad study by Rapacki and Próchniak (2009) that looks at convergence among 27 transition countries over the 1990 – 2005 period shows that convergence was unambiguously present in both the group of 8 Central and East European (CEE) countries and in the group of 10 countries (adding Bulgaria and Romania); i.e., those countries that were on a sure path to full EU membership. For South East European (SEE) countries (former Yugoslav states less Slovenia plus Albania, Bulgaria, and Romania) the study does find β (beta) convergence, but the results are far from robust.

The analyses performed by Pipień and Roszkowska (2019) on the dataset of 12 CEE and 12 CIS (Commonwealth of Independent States) countries for the 1992 – 2015 period shows strong variability of convergence parameters across the countries. The results suggest that for the CEE countries differences in the pace of convergence decreased over two sub-periods. However, in the CIS countries heterogeneity in the convergence parameters remained till the end of the observed period.

After the 'big bang' enlargement of the EU in 2004, a number of studies have analysed income differences between new member states (NMS) and core EU-15 states. Observing the new member states as a separate group seems fully justified, as these countries have had to undergo ambitious market reforms and after joining the EU became institutionally unified, as opposed to others that are either lagging behind in the accession process or are on their own transition trajectories. In their study on the convergence in relative income, Varblane and Vahter (2005) conclude that countries that joined the EU in 2004 plus Romania and Bulgaria have significantly closed the gap with the core EU-15, especially during the 2001 – 2004 period. A study by Vojinović, Oplotnik and Próchniak (2010), which limits itself to the new members that joined the EU as full members in 2004, finds that there was convergence at least within the time frame observed (1992 – 2006). Another study by Czasonis and Quinn (2012) that tests convergence using the 1993 – 2007 period also finds convergence between the CEE-10 and the core EU-15 states, and attributes this to the initial reforms of the EU accession process.

Using data for the same group of countries, Reza and Zahra (2008) confirm the absolute convergence of 10 new member states towards the average EU *per capita* income in the 1995 – 2005 period, but they reject the hypothesis of conditional convergence between these countries. Somewhat similarly, using a unit root test which allows for endogenous breaks in trend and constants, Zárembová, Lyócsa and Baumöhl (2012) confirm that both sigma convergence and time series convergence were present for the CEE-8 countries based on quarterly data for the period 1995 – 2011. However, convergence was present only prior to the breaks in trends, which for most countries in sample happened in 2007, after which convergence slowed down or was reversed. Using the pair-wise approach on quarterly data of GDP *per capita* for 23 EU member states and Norway in the 1995 – 2008 period. Gligorić (2014) provides evidence that the catching-up process dominated in Europe before the financial crisis, but that long-run convergence was present only on the level of three clubs that emerged as a somewhat homogeneous group.

A broad study by Stanišić (2012) explores convergence between the 'old' member states of the EU-15 and the new member states from Central and Eastern Europe (CEE-10), as well as within the two groups of countries, during the 1993 – 2010 period. The chosen period includes some of the effects of the financial crisis, thus being more complete by including business cycle downturns. The results show the presence of sigma convergence among the whole group of EU member states (EU-25), leading to the conclusion that there was a catching-up process. However, when observing the EU-15 and NMS countries, results confirmed convergence for the former but divergences for the latter group of countries after the global financial crisis.

The record of EU enlargement was widely considered to be a practical confirmation of the convergence hypothesis, until Monfort, Cuestas and Ordonez (2013) rejected it. Applying club convergence techniques to the 1990 – 2009 period, they discovered strong evidence of divergence between EU member states. Similar conclusions were obtained by Grela et al. (2017) in a broad study on the convergence process of 6 CEE countries towards the EU-15. They discovered that the general patterns of convergence had been changing over time and differed across countries. The process included a period of moderate catching-up in 1997 – 1999, an expansion period until 2008 during which most of the convergence took place, and a slowdown that lasted till 2016. This led to the conclusion that the post-transition growth model had reached its limits and that further convergence of the CEE region to the EU core cannot be achieved by simply replicating past efforts. This is also suggested by Csaba (2011), who concludes that the EU accession process is crucial for the reforms that lead to growth

and convergence but stops making a large contribution after full membership is achieved. Dobrinsky and Havlik (2014), who analyse economic convergence in the new EU member states of Central and Eastern Europe during the transition and the first years of EU membership, conclude that convergence is a difficult and ambitious endeavour. Their results indicate the presence of considerable and sometimes increasing heterogeneity of growth, pointing toward uneven economic convergence within the EU and within different time periods.

The states of former Yugoslavia are usually incorporated into the slightly broader category of Western Balkan States (WBS, which excludes Slovenia and adds Albania to the other ex-federal units of Yugoslavia) or the SEE region. Others have included them in the Balkans. The results of the studies are generally not very encouraging in terms of convergence. A study by Tsanana, Katrakilidis and Pantelidis (2013) that tests convergence of the Balkan countries to the EU-15 before the expansion of 2004 finds that only Slovenia and Greece were converging.

Some of the studies that deal with the period after the breakup, such as Stiperski and Lončar (2008), point out the differences between GDP growth and GDP *per capita* growth among the successor states of Yugoslavia, but are based on raw data and descriptive statistics using a geographical approach as an explanatory framework. However, studies of this nature do not deal with convergence.

The thorough and well-designed study by Botrić (2013) also analyses convergence of most of the states of the former Yugoslavia (less Slovenia plus Albania) with the EU-15 for the 1995 – 2010 period using the unit root test approach. The main finding is that these states are not converging to the EU-15. However, the study then tries a pair-wise panel root test that delivers mixed but very tenuous results. Finally, the study analyses a set of macroeconomic variables in order to explain the potential persistence of the gap with the EU-15. In spite of a commendable effort, it points only to increased investment, increased need for domestic savings, and higher export orientation as factors that might possibly be significant in closing the GDP *per capita* gap in purchasing power parity with the EU-15. The paper concludes that in the observed period the region did not benefit from the introduction of more market-oriented policies.

A similar study of these countries (less Slovenia and Croatia plus Albania) by Krstevska (2018) tests for convergence in the 2005 – 2016 period, dividing it into two sub-periods, pre- and post- the crisis of 2008. Convergence to the EU average is analysed, and the results show convergence for the whole period, with much stronger convergence before the crisis. All in all, convergence was found to be slow. Similarly, a study by International Monetary Fund economists led by Murgasova et al. (2015) finds that convergence to average European levels of *per capita* GDP was present in the WBS, but that it was slower than that of the

NMS. In recent research on the WBS countries, Siljak and Nagy (2018) confirm that these countries underwent a convergence process with the EU countries during the 2004 – 2008 period, but that the financial crisis during the 2008 – 2013 period slowed this process considerably. Nevertheless, convergence is confirmed for the 2004 – 2013 period as a whole. However, both studies measure convergence to the EU average *per capita* GDP in purchasing power parity and not to that of the EU-15, which is the subject of this study.

In a newer study, Stanišić et al. (2018) confirm the existence of a stochastic convergence process to the average GDP *per capita* of the EU-15 for just seven of the NMS. For the WBS there were no evidence of convergence of any country toward the average GDP *per capita* of the EU-15.

2. Data and Methodology

Let us start by looking at the record of both Yugoslavia as a whole and its republics and autonomous provinces. In the first decades after World War II a strong growth of the Yugoslav economy as a whole was evident, as shown by data from various sources. However, was it catching up with the developed Western European countries? The short answer is yes. Between 1951 and 1990 the *per capita* GDP of Yugoslavia (in 1990 GK international dollars[2]) rose from 28% to 37% of the average *per capita* GDP of the twelve most prosperous European nations.[3] However, the former republics (and later the new states) showed vast differences in the speed of the catching up process.

When considering an indicator that would adequately represent countries' economic development, we opted for GDP *per capita* in purchasing power parity. There are many reasons to criticise this indicator. There are alternative multidimensional indicators which tackle problems of wealth generation and its distribution. Nevertheless, for observing long convergence processes we are bound by the available data. For the former Yugoslav countries in the period before the 2000s only different versions of the GDP indicator are available. The comparable data for EU-15 and former Yugoslavia states can only be found in the Maddison project database. Therefore, we used their data on GDP *per capita* 1953 – 2016 calculated in Geary-Khamis dollars with the same purchasing power parity that the U.S. dollar had in the reference year.

[2] GK dollars are Geary-Khamis dollars, with the same purchasing power parity that U.S. dollars had in the reference year.

[3] Calculations based on data from the Maddison project, available at: <www.rug.nl/ggdc/historicaldevelopment/maddison/>. The twelve European countries are the UK, France, Germany, Italy (north only), Austria, Belgium, Netherlands, Denmark, Finland, Sweden, Norway, and Switzerland, as presented in the Maddison project database of 2013, 01 version.

As the convergence criteria we chose to track the difference in GDP *per capita* of the states that have emerged from the former Yugoslavia and the states that make up the EU-15. These include the 15 states that were members of the EU before the 'big bang' expansion of membership in 2004. We chose these countries because that have been in the EU longer than the new member states, have higher levels of income than the states of the former Yugoslavia, and did not have to undergo a radical transition to a market economy. Furthermore, a large part of the political legitimacy of the aspiration to accede to EU membership has been derived from the widely proclaimed expectations of a sure but steady catching up process in living standards measured by income level. We did not choose the EU average as a benchmark because this would bring the mean GDP *per capita* down and would include the transition countries. We also did not wish to choose a single, large high-income country like Germany as a proxy for the EU core because this would bring the benchmark GDP *per capita* up and would have its own problems of dramatic change over the observed period, such as the unification of Germany.

The level of disparity between ex-Yugoslav economies and core EU countries is presented in Figure 1, calculated as the ratio of GDP *per capita* for ex-Yugoslav republics to EU core countries.[4] The disparity between four out of six former Yugoslav republics and the EU-15 decreased between 1953 and the end of the 1980s.

Then we observe almost a decade of a rise in the gap and a slight reversal after the 2000s for all the new states formed from the republics of the former Yugoslavia. Naturally, during the wars of the breakup in the 1990s we observe a dramatic rise in terms of difference in GDP *per capita*.
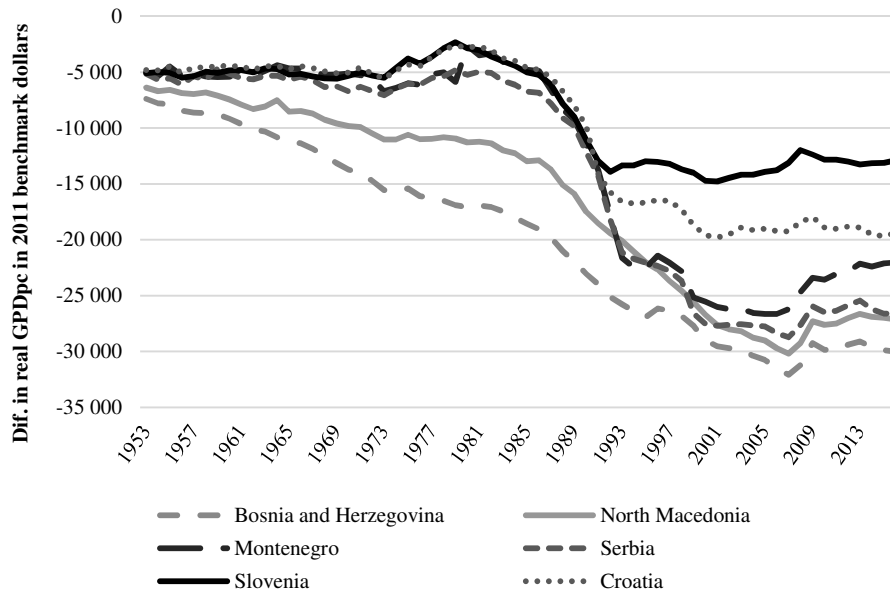
Two countries, Slovenia and Croatia, emerge from this period with a more moderate reduction in the level of GDP *per capita* gap compared to the EU-15 average. As late as 2016 the other states were lagging behind the EU-15 average more than they were in the 1980s. Although raw data provides a good overview, a deeper and more sophisticated analysis is needed to identify convergence.

The basic approach used for testing the convergence hypothesis across different economies or regions relies on the neoclassical growth model. It is based on evaluation of the sign of the coefficient β, which usually represents the responsiveness of the average growth rate to the gap between steady-state GDP *per capita* and its value at the beginning of the observation period. Later, with the development of panel data estimation methods, this method was extended to pooled data analysis.

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[4] Calculated as the average GDP *per capita* for the EU-15 economies that were part of the union before the 2004 enlargement.

Figure 1

Difference in GDP *per capita* between Ex-Yugoslav States and Average of EU-15 Economies

Source: Authors' calculation based on Maddison project database 2018 available at:
<https://www.rug.nl/ggdc/historicaldevelopment/maddison/releases/maddison-project-database-2018>.

Using panel analysis to shed light on the convergence process that is the focus of our inquiry, we tested for the presence of a unit root in the panel data, based on the Evans and Karras (1996) model. Guetat and Serrantito (2005) in turn explained and tested this model, using several procedures. In order to obtain the data for the unit root test we transform the original data using the formula:

$$GDPpc'_{it} = \left(GDPpc_{it} - \overline{GDPpc_t} \right) \qquad (1)$$

where $GDPpc_{it}$ is the GDP for the *i*-th country ($i = 1, 2, \ldots, N$) in the *t*-th year ($t = 1, 2, \ldots, T$) and $\overline{GDPpc_t}$ represents the cross-economy average value of the GDP *per capita* in period *t*. Using this transformation, we test the hypothesis of absolute β convergence in which the new data represents a unique balanced growth path. If convergence is present, then the calculated series $GDPpc'_{it}$ is stationary for all panels; otherwise a unit root will be present in at least one panel. In addition to this transformation, we test the convergence hypothesis with a panel unit root test based on the formula:

$$GDPpc^*_{it} = ln \left(GDPpc_{it} / \overline{GDPpc_t} \right) \qquad (2)$$

Burcu (2014) suggests this transformation and observes a convergence process between eighteen EU countries that is both stochastic and deterministic. The most common unit root test that can be used for this purpose is the Levin-Lin-Chu (LLC) test. It is based on a general framework that allows individual fixed effects, common effects, and different dynamics across different groups in the sample. A major limitation of the LLC test is the assumption that all panels have the same value of ρ. The IPS test (Im, Pesaran and Shin, 2003) relaxes the assumption of a common ρ and instead allows each panel to have its own ρ_i. Besides allowing for heteroskedasticity, serial correlation, and non-normality, this test also allows for heterogeneity of trends and of the lag coefficient under the alternative hypothesis of no unit root. Using the testing procedure for heterogeneous panels is often necessary, as noted by Kalita and Tiwari (2012), since even when testing for convergence between the regions of the same country (as these authors do for India) it is unrealistic to assume homogeneity in the data between them. The null hypothesis for each test is that all panels contain a unit root.

In contrast to the approach of LLC and IPS when testing for the presence of a unit root in the series of panels, the test proposed by Hadri (2000) is based on the null hypothesis of stationarity. His test is an extension of the KPSS test developed by Kwiatkowski et al. (1992) in the time series context. As concluded by Hlouskova and Wagner (2006), Hadri's approach stating that panels are stationary is more conservative than the LLC and IPS approach since it tends to reject the null hypothesis of stationarity most of the time, even for stationary series. LLC and Hadri unit root tests are first generation tests, since they share the limitation of assuming that the cross-section units of the panel are independent. The cross-unit independence assumption of the first-generation tests is quite restrictive in many empirical applications and can lead to severe size distortions (Breitung and Das, 2008). The cross-sectional independence hypothesis is rather restrictive and somewhat unrealistic in the study of convergence, since in reality co-movements of economies are often observed. Therefore, we also consider second-generation unit root tests that allow cross-unit dependencies with the tests developed by Pesaran (2003). He proposed a different approach to dealing with the problem of potential cross-sectional dependencies. If residuals are not serially correlated, the regression used for the i-th country is defined as:

$$\Delta y_{it} = a_i + \rho_i y_{it-1} + c_i \overline{y}_{t-1} d_i \Delta \overline{y}_t + v_{it} \tag{3}$$

Pesaran's test is based on individual Cross-sectional Augmented Dickey Fuller statistics (CADF), the idea behind this approach being to build a modified version of the IPS t-bar test based on the average of individual CADF statistics, which for a cross-sectionally augmented IPS is called CIPS.

Most of the original papers on convergence that utilise the unit root approach would reach a conclusion about the convergence process based on the results obtained up to this point. This can be potentially misleading if the cross-sectional units of observation are not independent. If we take into account possible cross-sectional dependency, which is a realistic assumption, the conclusion could be different, bearing in mind that GDP *per capita* in each former Yugoslav republic was highly influenced by sharing a common market within that period. The test statistic of Pesaran-CIPS takes into account that possibility. A potential case where the Hadri-LM test rejects the hypothesis of the stationarity process for all panels with the opposite rejection of non-stationarity when cross-dependent behaviour between states is introduced, can indicate that there is probable convergence to the selected benchmark. Here, however, convergence is not present in a direct way that would require all states to follow the same growth trajectory.

Therefore, when testing for the presence of so-called 'β' convergence, the results have to be interpreted very carefully. As Maddala (1999) points out, in panel unit root tests "the rejection of the null hypothesis does not mean that all series are stationary. Similarly, a non-rejection of the null hypothesis does not mean that all the series are unit-root processes" (Maddala, 1999).

As such, the unit root approach for convergence testing can be criticised from both the theoretical and empirical standpoint, as noted by Phillips and Sul (2009). Therefore, we have decided to apply Philips and Sul's (2007) novel approach to testing the convergence hypothesis, based on a nonlinear time-varying factor model that allows for the presence of smaller convergence clubs inside the larger group of countries. A recent paper by Barrios et al. (2020) uses this method but only to analyse convergence among the regions of Serbia.

This methodology has, generally speaking, significant advantages over alternative methods that are typically used when testing convergence. Primarily, the club convergence test does not *a priori* group the unit of observation based on the researcher's decision or some generally reached consensus (e.g., grouping countries into developed or undeveloped categories based on an income threshold), thus influencing potential results. On the contrary, the club convergence method forms groupings endogenously, based on the data which suggest the formation of clubs under the influence of some undetermined factor or factors. In their analysis of real convergence between EU member states, Monfort, Cuestas and Ordonez (2013) point out additional advantages of this approach in comparison to the co-integration or panel unit root tests that are typically used in the convergence literature. The advantages include addressing the issues of individual heterogeneity, economic structure, heterogeneous effects, economic transition, convergence paths, and more.

This procedure of panel convergence identification is called the 'log t' regression test and is built on a clustering algorithm that can model long-run equilibria within a heterogeneous panel outside of the co-integration setup. The greatest advantage of this approach is that it avoids the assumption of trend stationarity or stochastic non-stationarity. This allows the model to detect the convergence process despite the presence of non-stationarity in the time series. Unlike the panel unit root model that we implemented in the first phase of testing the convergence, this approach can distinguish the asymptotic co-movement of two time series. Therefore, its application excludes the possibility of inaccurately rejecting the convergence hypothesis.

Unlike the original paper by Philips and Sul (2007), which gives a detailed explanation of the algorithm, we will provide a brief description of the basic steps. The first isolates and separates the cyclic component of the variable X_{it} that the convergence hypothesis is being tested for (which is typically done by applying a Hodrick-Prescott filter or any additional method[5]). Afterwards, a smoothed version of the data is sorted in descending order with respect to the value of the observation in the last period (i.e., the first country/region having the highest GDP *per capita*), or, alternatively, to the average of data values for a certain proportion of periods (i.e., 1/2 or 1/3) if high volatility is present. The next step is to form a group of k first individuals for which the log t regression[6] satisfies the condition $t_k > -1.65$ for the subgroup $\{k, k + 1\}$. If it turns out that no group satisfies the condition, the algorithm determines that there is no convergence of subgroups in the panel. If there is a subgroup that meets the former condition, the log t regression is repeated so that the individuals for which the test yields the highest value are now all grouped together. In the third step, units in the non-core group are sequentially included, and another log t test is carried out for each of them. If the test statistic is higher than criteria c^* the selected individuals form the initial convergence club. For the small T sample the critical value c^* can be set to 0 so it is highly conservative, while for the large T the asymptotic 5% critical value of -1.65 is recommended. The final step implies repetition of step three on the rest of the individuals that are not part of the obtained initial convergence club. If the resulting t statistic of the performed log t regression is higher than -1.65, these individuals represent an additional convergence group. Otherwise, steps two and three are repeated for these individuals to determine if they can be divided into smaller convergence clubs. When there is no k for which $t_k > -1.65$

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[5] The Stata module that has been used for the estimation can also implement the Baxter-King, Butterworth, or Christiano-Fitzgerald filters.

[6] To test the null hypothesis of convergence, Philips and Sul (2007) developed a regression t-test. They call the one-sided t-test the log t-test.

for the remaining individuals in the panel, we conclude that they exhibit divergent behaviour. In addition, Phillips and Sul (2007) propose modelling the idiosyncratic element φ_{it} by building a relative measure of such co-effect to the panel average in the form:

$$h_{it} = \frac{X_{it}}{\dfrac{\sum_{i=1}^{N} X_{it}}{N}} = \frac{\varphi_{it}}{\dfrac{\sum_{i=1}^{N} \varphi_{it}}{N}} \tag{4}$$

By doing this, the h_{it} measure can be observed as a relative transition path that traces an individual path for each country i relative to the average panel data. Thus, h_{it} measures the trajectory of each country i from the starting position relative to the common growth path. When countries share a common behaviour in the growth path, i.e., $h_{it} = h_t$, that group could form a convergence club, and the common behaviour could trace the club's common growth path in the panel data.

3. Results and Interpretation

As already noted, we need to test the existence of convergence in two sub-periods. The first covers the socialist period of Yugoslavia. The second period is characterised by the wars, the breakup, and the attempts of the newly formed states that emerged from Yugoslavia to implement their own version of transition to a market economy.

It should be kept in mind that the possibility of EU membership was offered to the countries of the region, with two of the former republics joining the EU as full members (Slovenia and Croatia) and others being generally on the EU accession track with two of them opening negotiations (Montenegro and Serbia). In other words, all were on the path not only of transition but, at various speeds, of EU accession. This in itself should have boosted deeper and quicker reforms, and consequently higher growth.

3.1. Results of Unit Root Tests of Convergence

The results presented in Table 1 refer to the socialist period in Yugoslavia. The results of the first-generation panel unit root tests are mixed. The IPS test statistic for the first form of the transformed indicator *GDPpc* (GDP *per capita*) suggests that the presence of a unit root in the whole panel cannot be rejected, while for the second transformation the null hypothesis is rejected at the 1% level of significance. The test statistics for the Hadri-LM test are more straightforward, as for all indicator forms it strongly rejects the null hypothesis of all

panels being stationary; hence there is no convergence of all states to the EU-15 benchmark. The alternative hypothesis for the Hadri panel unit root test is that at least one panel contains a unit root. Because of this, even if five states converge to the EU-15 and one does not, it will still reject the null hypothesis of all panels being in a stationary process.

T a b l e 1
Unit Root Test for *GDP per capita'$_{it}$* and *GDP per capita*$^*_{It}$, 1953 – 1989

	Generation I				Generation II	
	Im-Pesaran-Shin		Hadri-LM		Pesaran CIPS	
	W-t-bar	*p-value*	*Z-stat*	*p-value*	*Chi-sq*	*p-value*
GDPpc'$_{it}$	5.176	0.999	47.445	0.000	0.318	0.625
GDPpc'$_{it}$ trend	5.406	0.999	10.207	0.000	−1.785	0.037
GDPpc$^*_{it}$	−2.711	0.003	51.411	0.000	−4.048	0.000
GDPpc$^*_{it}$ trend	−1.847	0.032	11.1046	0.000	−3.458	0.000

Note: The optimal lag length is estimated using AIC criteria.
Source: Authors' calculations.

Similar conclusions can be made for the period after the breakup of Yugoslavia, for which the results are presented in Table 2. Again, first generation tests provide us with somewhat contradictory results. IPS rejects the hypothesis that all panels contain a unit root, while Hadri-LM rejects the hypothesis of all panels being stationary. The CIPS test also rejects the hypothesis that panels contain a unit root when taking into account cross-sectional dependency.

T a b l e 2
Unit Root Test for *GDP per capita$_{it}$* and *GDP per capita*$^*_{it}$, 1990 – 2016

	Generation I				Generation II	
	Im-Pesaran-Shin		Hadri-LM		Pesaran CIPS	
	W-t-bar	*p-value*	*Z-stat*	*p-value*	*Chi-sq*	*p-value*
GDPpc'$_{it}$	−3.350	0.000	21.107	0.000	−1.390	0.082
GDPpc'$_{it}$ trend	−0.476	0.317	26.337	0.000	−3.108	0.001
GDPpc$^*_{it}$	−6.556	0.000	19.410	0.000	−5.087	0.000
GDPpc$^*_{it}$ trend	−6.526	0.000	20.297	0.000	−5.858	0.000

Note: The optimal lag length is estimated using AIC criteria.
Source: Authors' calculations.

If we combine the results for the two observed periods it is possible to draw a few conclusions. The presence of convergence between states of former Yugoslavia and the EU-15 benchmark was registered in some sub-periods before and

after the breakup of the federation. However, this process was most probably the result of some states converging to the EU-15 benchmark while others had a different growth trajectory. This should not come as a surprise because there was divergence between the former republics in terms of GDP *per capita* even in the socialist period, although various policies were implemented in order to narrow these differences over the longer term.

These results led us to further pursue this possibility by using club convergence panel tests.

3.2. Results of Club Convergence

We continued by applying the Phillips and Sul clustering algorithm presented earlier in order to test for the presence of club convergence between smaller groups of former Yugoslav states and the EU-15 benchmark of average GDP *per capita* for these groups.

T a b l e 3

Log *t* Test Statistics for Former Yugoslav States and Average EU-15 GDP *per capita,* for Two Periods

	1953 – 1989	1990 – 2016
log *t* coefficient	–0.490	–0.100
S.E.	0.015	0.057
T-stat	–32.683	–1.742
n – individuals	7	7
Time periods	37	27
Periods discarded before regression	9	7

Source: Authors' calculations.

In Table 3 we present the test statistics for the log *t* regression on the initial classification of convergence clubs. The log t test statistic (calculated as –32.683) in the second column of Table 3 is less than the critical value, therefore we reject the hypothesis of group convergence. Following up on the tests for the potential presence of club convergence that indicated that four former Yugoslav republics shared the same transition path as the EU-15 during the period of socialism, we conclude that Bosnia and Herzegovina and North Macedonia were not in this group, as they had different transition paths relative to the panel average.

T a b l e 4

Club Formation for Period 1953 – 1989

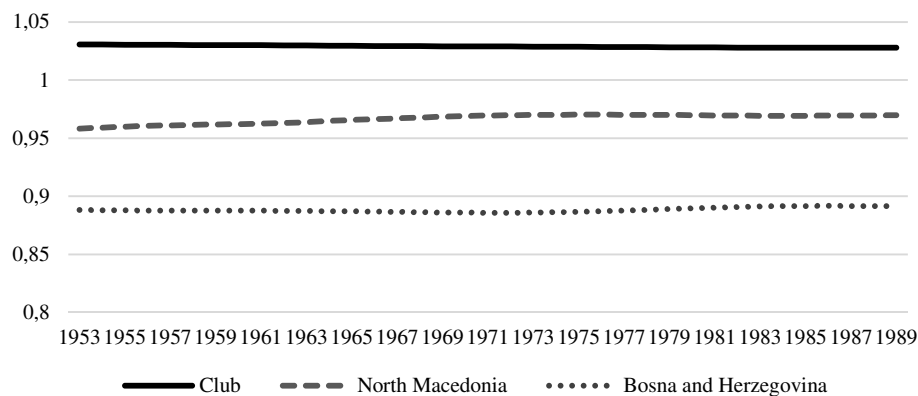|	States	Coefficient	t-statistic
Club 1	EU-15, Montenegro, Serbia, Slovenia, Croatia	0.611	4.372
Non-convergent group	Bosnia and Herzegovina, North Macedonia	–0.663	–14.717

Source: Authors' calculations.

This can be observed in Table 4 and Figure 2, which indicate that the transition paths of North Macedonia and Bosnia and Herzegovina were below average and almost equidistant throughout the period.

Figure 2 shows the relative transition paths for the club of convergent countries and for the non-convergent economies. Transition paths are based on the h_{it} value for log-*GDP per capita* data that has been smoothed implementing the Hodrick-Prescott filter, as suggested by Phillips and Sul (2009).[7] Based on these transition paths, countries that formed a club are constantly above the panel average, with North Macedonia and Bosnia and Herzegovina keeping almost a steady distance from them. Based on the data, it can be argued that the differences in GDP *per capita* decreased between most states of the former Yugoslavia – Montenegro, Serbia, Slovenia, and Croatia – and the EU-15. North Macedonia and Bosnia and Herzegovina, on the other hand, were in the group that was not converging.

F i g u r e 2

Transition Paths for Club and Non-convergent Countries

Source: Authors' calculations.

3.3. Post-breakup Club Convergence

In the aftermath of Yugoslavia's breakup, the emerging states implemented somewhat different approaches to the transition to a market economy. Slovenia is the only country that has emerged successfully from the transition process: the other states are still struggling to complete the process in varying degrees. The test statistic of the convergence hypothesis for this period is presented in the

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[7] To check consistency, besides the HP filter we also implemented Baxter-King, Butterworth, and Christiano-Fitzgerald filtering approaches, which yielded the same results regarding country club convergence.

fourth column of Table 2 where the test statistic of –1.742 is below the critical level, which rejects the null hypothesis of group convergence.

Although one could speculate that this is the result of hugely distorted economic growth during most of the 1990s, it should be noted that, as stated in the brief overview of the process, the log t regression implements a smoothing procedure by trimming the part of the data in the volatile panel series.[8]

The test for presence of club convergence presented in Table 5 indicates that there are two convergence clubs, in each of which countries are experiencing a similar transition path. The first comprises the EU-15 benchmark together with Slovenia and Montenegro. The second consists of the rest of the former Yugoslav states. The potential merging of these groups is rejected due to the test statistics (calculated value of 0.215) being larger than the critical value. Their transition paths, presented in Figure 3, show that the trajectories of club 1 and club 2 are somewhat parallel, with the trajectory of club 2 clearly being at a much lower level.

T a b l e 5
Club Formation for the 1990 – 2016 Period

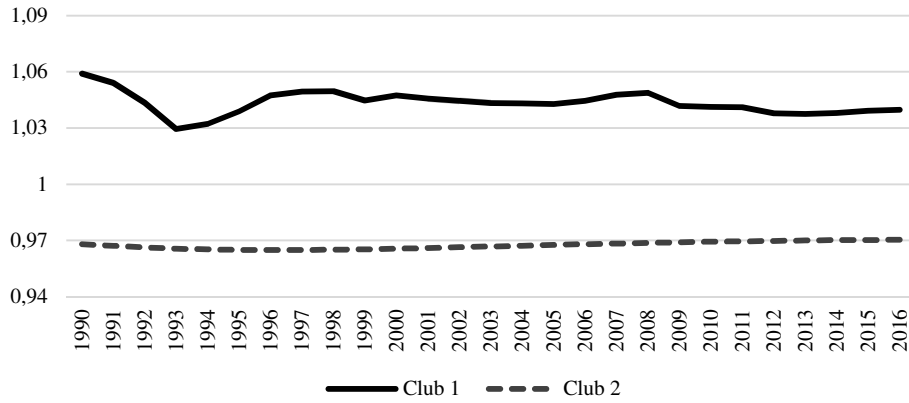|	Countries	Coef.	t-stat	Merging clubs	Coef.	S.E.	t-stat
Club 1	EU-15, Montenegro, Slovenia	0.255	2.119	Club 1 + 2	0.010	0.048	0.215
Club 2	Bosna and Herzegovina, North Macedonia, Serbia, Croatia	0.104	4.157				

Source: Authors' calculations.

When interpreting the obtained results of club convergence, the level of country development should not be confused with club membership. Although Croatia is a member of the EU and is far ahead of Montenegro and North Macedonia in terms of *GDP per capita,* the convergence hypothesis actually tests Croatia's long-term growth-path trajectory.

This can be seen in the Figure 4, which shows the individual transition paths for the members of club 1. It is obvious that Montenegro is below the average, with a slight tendency to link up with the rest of the club members over the long run. It should be noted that Montenegro's economy is small compared to the other countries of former Yugoslavia and has a high inflow of FDI, which on average over the last ten years has exceeded 14% of GDP[9] and could explain Montenegro's membership in this club.

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[8] As an additional robustness check we implemented the same procedure for the period 1990 – 2016. There was no change in the results regarding allocation of countries into two convergence clubs.
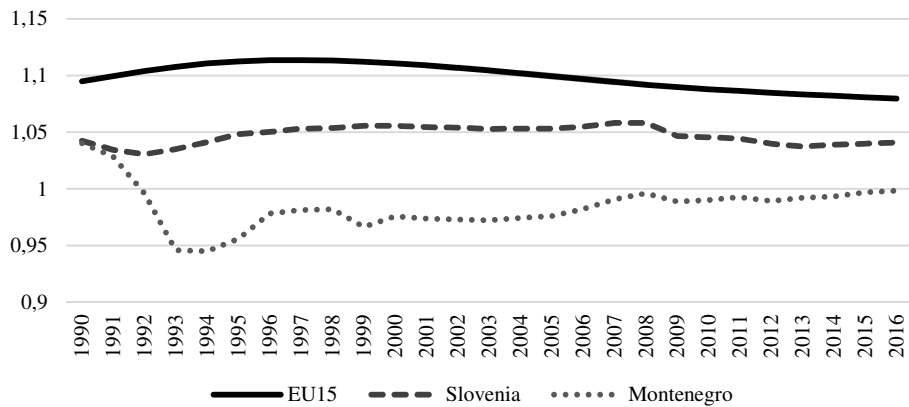
[9] WORLD BANK (2020): World Development Indicators 2020. *Foreign Direct Investment, Net Inflows (% of GDP)* [Data file.] Available at:
<https://databank.worldbank.org/source/world-development-indicators>.

Figure 3

Transition Paths for Club 1 and Club 2

Source: Authors' calculations.

Figure 4

Transition Paths for Club 1

Source: Authors' calculations.

4. Discussion and Conclusion

Convergence is a long-term process, which is the reason that our samples included the longest possible periods to test convergence and club convergence. The goal was to establish the existence or non-existence of convergence to the EU-15 in GDP *per capita*. As far as we know, this is the first research on convergence of the former Yugoslav republics, later independent states, in GDP *per capita* to that of the core states of the European Union (the EU-15) in the 1953 – 1990

period. Yugoslavia as a whole was catching up with the countries of Western Europe during this period, but federal units had different growth rates which increased divergence among them in spite of failed policies to prevent this outcome.

These policies differed during the period before the breakup, but had the same goal of narrowing the income *per capita* differences between the republics and the autonomous provinces that were classified as developed and underdeveloped regions. However, it should be noted that till the 1980s the problem of disparity between the regions was not one of stagnation. On the contrary, rapid growth rates were registered in all parts of Yugoslavia, as were deep structural changes.

The rising disparities were in the regions' income *per capita*. These disparities were only in part due to high population growth rates in the lower income regions. Another reason was that price controls were designed in such a way that they affected certain sectors (agriculture, basic commodities), thus actually (but unintentionally) lowering the income of less developed regions. Furthermore, employment by sector, with less developed regions having more employment in less productive sectors like agriculture, added to the disparities in income *per capita*. Another way to look at the reason for growing disparities is through the type of investments undertaken in the less developed regions, as elaborated by Kukić (2017). There are other angles through which this issue can be approached that could contribute to some of these and foster other explanations, as investigated in Milanović (1987).

As already mentioned, the policies to mitigate these disparities varied. The latest instrument for reduction of reginal disparities in Yugoslav was the Fund for Accelerated Development of Underdeveloped Regions (FAD), established in 1965. It is not easy to access in constant dollar terms the size of the transfers through the FAD to the underdeveloped regions. However, these transfers did make a significant contribution of 30% of investments in the regions. An analysis of the working of the FAD in a later period by Kraft (1992, p. 15) found that in the 1984 – 1988 period total transfers amounted to a 1.4% yearly average of the Gross Social Product (GSP) of Yugoslavia (a measure close to GDP). These transfers made a huge difference in terms of the regions' percentage of GSP, amounting to more than 4% and 5% for Macedonia and Montenegro respectively, and an astonishing 24% for Kosovo.

The stagnation in Yugoslavia came in the 1980s after a period of rapid growth and convergence to the EU-15. As convergence tests at the level of Yugoslavia as a whole can be misleading in terms of convergence of its constituent federal units, a test for possible convergence clubs among the republics was undertaken. The results for the socialist sub-period show that economic development in the majority of the former Yugoslav republics was significantly on a path of convergence

to the EU-15 average. What probably aided the convergence process for Yugoslavia as a whole and most of its parts was certainly the process of industrialisation in the new industrial sectors (cars, appliances, television, radio, heavy and later light industry) as well as the building of infrastructure. The fact that agriculture was not collectivised certainly contributed as well. However, two of the six republics are exceptions regarding the convergence process: Bosnia and Herzegovina and North Macedonia, as they were not on the path to convergence to the EU core. This is somewhat surprising and invites further research.

These results (given the comparison with post-socialist or transition period) should not be interpreted as proof that the socialist period was superior. All they attest to is that Yugoslavia as a whole, as well as the majority of its federal units, were on a convergence path to the EU-15 in GDP *per capita* during that period. The question is whether that process would have continued. A clear answer to that question is obviously impossible. Perhaps the stagnation of the 1980s indicates that the economic system and development model had reached its limits. One should remember, however, that during this same period 'euro-sclerosis' was much discussed and that the developed countries of Western Europe also entered a period of stagnation. The real question then boils down to the capability of the Yugoslav political and economic system to adopt reforms that would have kept the country on a path of convergence to the developed countries of Europe.

In terms of convergence, the results of the post-conflict independent states in the transition period 1990 – 2016 are more disappointing. In the aftermath of the Yugoslav breakup, convergence to the EU-15 average is present only in Slovenia and Montenegro (whose small population and large FDI make it highly specific), with the rest of the states forming a separate club that follows a different growth path.

The results can be interpreted in various ways. It should not be forgotten that the destruction due to the conflict was not evenly spread (with the only two states completely spared being Slovenia and North Macedonia). Furthermore, the armed conflicts ended at different times, causing different transition dynamics. It should be kept in mind that Bosnia and Herzegovina and Serbia were most devastated and that Serbia seriously entered transition only in 2001.

The Great Recession of 2008 was certainly a factor that affected the results (with Croatia experiencing the lowest average ten-year growth rates among the new independent states of the former Yugoslavia). In spite of the above, the fact that our tests show that only Slovenia is on a convergence path to the EU core is not a favourable result given that all the rest have undergone, if not totally completed, the transition process to a market economy and have all taken measures to enact the reforms needed for EU accession. Here we exclude Montenegro, due to its size and specific foreign direct investment surge during the period of devolving from the federation with Serbia in 2006.

Overall, these results highlight the importance of evaluating convergence using different sample periods and multiple test procedures that accommodate cross-correlation and heterogeneity. The possibility that convergence is present but not at the level of the whole group should be taken into account. A group can be split into clubs of countries that differ in their transition paths.

The EU is the only region in the world in which the process of convergence in GDP *per capita* between the less wealthy and the wealthier nations occurred slowly and systematically over the years. Convergence became one of the sources of the EU's legitimacy and credibility. The fact that convergence has been interrupted in recent years in some of the new member states and that states aspiring to membership are not experiencing convergence should be more prominent on the EU agenda if the proclaimed and promised EU expansion is to be successful. In short, the lack of convergence deserves policy recommendations. The experience of Yugoslavia in promoting policies to stimulate the reduction of regional disparities and their failure should be taken into account when designing the latest EU investment packages for the Western Balkans.

The experience of Yugoslavia should be a warning to the EU that convergence is difficult when there are wide disparities, and that policies to enhance this process are complex and difficult and must be well designed. Furthermore, it should be kept in mind that growing disparities when combined with stagnation exacerbate political conflict and crisis.

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